

The Genus *Enlinia* Aldrich in Chile (Diptera: Dolichopodidae), with the Description of Four New Species

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Abstract

Four new species of *Enlinia* Aldrich are described from Chile: *Enlinia biobio* n. sp., *Enlinia chilensis* n. sp., *Enlinia enormis* n. sp., and *Enlinia isoloba* n. sp. These specimens were collected during a 2013 invertebrate survey in sclerophyll and Valdivian temperate rain forest habitats of the central and southern Chilean Andes. The only other species of *Enlinia* recorded from Chile is *E. atrata* (Van Duzee). Photos of holotypes and type localities and a key to the five species known to occur in Chile are provided.

Introduction

Enlinia Aldrich, 1933 is a genus of minuscule flies regarded as “micro-dolichopodids,” an informal collection of genera containing species with a body length around 1.0–1.5 mm (Bickel 2009; Runyon & Robinson 2010). The relationship of *Enlinia* with other micro-dolichopodid genera is discussed in Robinson (1969), Runyon & Robinson (2010), and Runyon (2015). Species of *Enlinia* can be recognized by the combination of minute body size, generally dark with only weak metallic reflection, wing veins that are nearly straight and evenly diverging from wing base (venation modified in some males), acrostichal setae present, and face without setae. *Enlinia* is found only in the New World and is at present the most speciose of the micro-dolichopodid genera with about 85 described species (Yang *et al* 2006; Runyon & Pollet 2018),

but many species await description. Most species are known from Mexico (53 species), but *Enlinia* is also recorded from the USA and Canada (7 species), southern Central America (3 species), South America (7 species), and throughout the Caribbean (15 species) (Aldrich 1896; Botosaneanu & Vaillant 1973; Robinson 1964, 1969, 1973, 1975; Robinson & Arnaud 1970; Steyskal 1975; Runyon & Pollet 2018). In tropical South America, six species were recently described from French Guiana (Runyon & Pollet 2018) and one species, *E. atrata* (Van Duzee, 1930), is known from Chile. The small number of species currently documented from South America is likely the result of lack of collecting in suitable places, or of sample processing (with a focus on tiny flies), as a great number of species of *Enlinia* undoubtedly occur in South America. Thus far, specimens of this genus have, indeed, also been detected

in samples collected in Colombia, Ecuador, Bolivia (Pollet, unpubl. data), and Venezuela (Bickel 2009). *Enlinia* and *Harmstonia* Robinson, 1964 are the only representatives of the Enliniinae, a subfamily entirely confined to the New World.

The purpose of this paper is to describe four new species of *Enlinia* collected by MP during an invertebrate expedition in central and southern Chile in 2013. We also provide a key to the five known Chilean species.

Material and Methods

The survey “Arthropods of Valdivian Temperate Rain Forests (AVTR)” was conducted by MP between 3 and 27 January 2013 and encompassed four different provinces (VII Maule, VIII Bío-Bío, IX Araucanía, X Los Lagos) in the central and southern Chilean Andes (71°07'W–72°35'W), between 35°03'S (Curicó) and 41°35'S (SE of Puerto Montt). The following national parks (PN) and reserves (RN) were included in this survey: (nr) Ñuble RN, Conguillío PN, Puyehue PN, and Alerce Andino PN. Sampling was mainly conducted with traps and sweep nets. At seven different locations, between one and three sites were selected for sampling in sclerophyll (northernmost sites) and Valdivian temperate rain forest. At most sampling sites, one Malaise trap and a series of 10 yellow, 10 white, and 10 blue pan traps were used for time periods ranging from 4 (southernmost) to 21 days (northernmost sites). A total of 351 pan traps and 11 Malaise traps were employed. In addition, 124 dolichopodid samples were collected with sweep nets in 21 different sites and including sites sampled with traps. A variety of habitats, including swamps, beaches and banks of lakes, ponds, and streams, were sampled using sweep nets. During sweeping, special attention was also given to microhabitats like tree trunks, seeps on rocky surfaces, and rocks in rivers. All collected material was stored in 70% alcohol during the expedition, with all *Enlinia* specimens being dry mounted on pins using hexamethyldisilazane (HMDS) in 2018 in the laboratory. Descriptions and illustrations are based on specimens in alcohol and then re-checked once specimens were dried.

This paper generally follows the format used in Robinson (1969) to facilitate comparisons and identifications across species in this large genus since Harold Robinson (USNM) has described nearly all species of *Enlinia* to date. However, we follow Cumming & Wood (2009) for notation of non-genitalic structures including antennal segments and wing veins. Measurements on body and wing lengths were carried out on all available specimens. In descriptions, the position of features on elongate structures, such as leg segments, is given as

numerical fractions of the total length, starting from the base (e.g., seta at 1/3), but spelled out as words for proportions (e.g., “on apical two-thirds,” “yellow on distal half”). Macrotrichia are referred to as setae, hairs, or setulae depending on relative decreasing length and thickness. The width of the lower face is compared with the width of the ommatidia bordering the lower face. The width of the epandrium is measured as the greatest width in lateral view. The postabdomen in intact dolichopodid specimens is rotated approximately 180° and lateroflexed to the right, but in descriptions, “dorsal” and “ventral” refer to the morphological positions prior to rotation and lateroflexion (e.g., “up” in genitalia of intact specimens is ventral). Holotypes and part of the paratypes will be deposited in the Museo Nacional de Historia Natural de Chile (MNHN, Santiago, Chile) and the Royal Belgian Institute for Natural Sciences (RBINS, Brussels, Belgium). Label data for primary types are cited verbatim with data from each label in quotation marks with lines on labels delimited by a slash (/), and annotations are placed in square brackets, i.e., []. Material from this work is also housed in the following collections: MAPC = Marc A. Pollet private collection, Welle, Belgium; MTEC = Montana Entomology Collection, Montana State University, Bozeman; USNM = National Museum of Natural History, Smithsonian Institution, Washington, D.C.

The holotype of *Enlinia atrata* (Van Duzee) was examined and photographed by MP in the Natural History Museum, London (NHMUK), in March 2017 and by Duncan Sivell (NHMUK) in August 2018.

Taxonomy

Enlinia Aldrich, 1933

Collinellula Aldrich, 1932: 4. Preoccupied by *Collinellula* Strand, 1928.

Enlinia Aldrich, 1933: 168. Replacement name for *Collinellula* Aldrich, 1932.

Recognition. The combination of the following character states diagnoses of *Enlinia*: body length less than 2.0 mm (usually less than 1.5 mm). Vertex of head not excavate. Antennal scape without dorsal setae; pedicel without medioapical thumb-like projection; first flagellomere mostly rather globular, arista apical. Male and female face without setae. Proepisternum with at most a few, small hairs; acrostichal setae present, biseriate; posterior mesonotum distinctly flattened and slightly depressed. Femora without distinct anterior preapical seta. Wing with veins $R_2 + 3$, $R_4 + 5$, M_1 , and CuA_1 nearly straight and evenly diverging from wing base (venation modified, sometimes strongly so, in males of some species).

Key to Species of *Enlinia* Aldrich from Chile (males)

1. Body, including legs, wholly black (Fig 1a), dorsum of thorax at most with slight blue reflections; mid femur with about 10 strong ventral setae on basal half *Enlinia atrata* (Van Duzee)
- Dorsum of thorax dark metallic green (Fig 1b–e); mid femur with less than 5 small setae on basal half (usually only 1 weak ventral seta at base) ... *Enlinia chilensis* species group..... 2
2. Legs mainly yellow (Fig 1c); fore tarsus with tarsomere 2 only slightly expanded and tarsomere 3 with very small posteroventral seta (Fig 2b, c); ventral lobe of cercus with five subequal black marginal setae (Fig 3b, c) *Enlinia chilensis* n. sp.
- Legs entirely brown to black (Fig 1b, d, e); fore tarsus with tarsomere 2 distinctly expanded and heart-shaped, fore tarsomere 3 with strong posteroventral seta (Fig 2a, d, e); ventral lobe of cercus never with five subequal marginal setae (Fig 3a, d–f) 3
3. Larger species, with body length about 2.0 mm; ventral lobe of cercus ovate with about 12 large similar-sized setae along margin; surstylus not or scarcely projecting beyond cerci (excluding marginal setae) (Figs 1d and 3d) *Enlinia enormis* n. sp.
- Body length 1.6 mm or less; ventral lobe of cercus more of less digitiform, with less than 5 large marginal setae; surstylus distinctly projecting beyond cerci (excluding marginal setae) (Fig 3a, e, f) 4
4. Body length about 1.6 mm; ventral lobe of cercus longer than dorsal lobe; longest cercal setae about as long as width of epandrium (Fig 3a); fore femur without row of anteroventral setae, with only one ventral seta near base; hind tibia with row of 5–6 distinct dorsal setae (as in Fig 4a) *Enlinia biobio* n. sp.
- Body length about 1.0 mm; ventral and dorsal lobes of cercus of nearly the same length; longest cercal setae about twice as long as width of epandrium (Fig 3e, f); fore femur with row of short anteroventral setae (as in Fig 5); hind tibia with 3–4 small dorsal setae (Fig 4b) *Enlinia isoloba* n. sp.

Enlinia chilensis Species Group

Diagnosis. This species group is characterized by the following combination of features in males: dorsum of thorax dark metallic green (Fig 1b–e); anterior slope of scutum with pair of large inwardly directed setae; 6 dorsocentral setae; proepisternum with large ventrally directed seta; wings unmodified (as in Fig 6); fore tarsus with tarsomere 2 broadened and forming posterior lobe, and tarsomere 3 with one black ventral seta (Fig 2); middle femur without long, stout ventral setae near base; abdominal sternites unmodified,

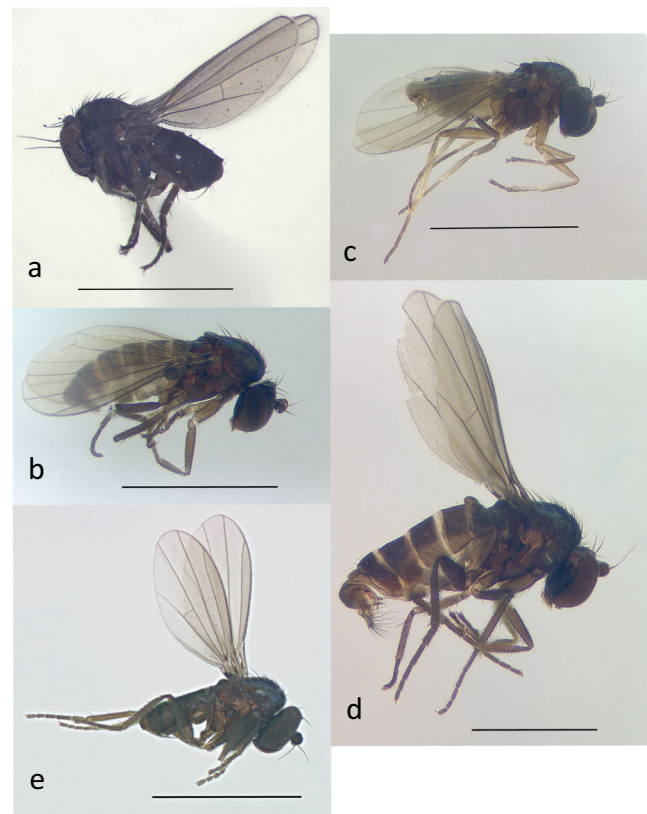


Fig 1 Chilean *Enlinia* species, male habitus. **a** *Enlinia atrata* (Van Duzee), holotype; **b** *Enlinia biobio* n. sp., holotype; **c** *Enlinia chilensis* n. sp., holotype; **d** *Enlinia enormis* n. sp., holotype; **e** *Enlinia isoloba* n. sp., holotype. Scale bars 1.0 mm. Photos by Justin Runyon, except for Fig 1a by Marc Pollet.

without projections or armatures; surstylus deeply divided into two lobes; cercus bilobed, with each lobe bearing one to many long black apical/marginal setae (Fig 3). Females with face very wide, about as broad as first flagellomere height (in anterior view); mid tibia with ventral seta at apex and with more dorsal setae than in male. This species group includes *E. biobio*, *E. chilensis*, *E. enormis*, and *E. isoloba*. *Enlinia atrata* does not appear to belong to this group based primarily on the body color and the presence of stout ventral setae on basal half of mid femur.

Remarks. This group shares characteristics with the *Enlinia armata* group (Robinson 1969), particularly the pair of large inwardly directed setae on the anterior slope of the scutum (these arise slightly anterior to and between the rows of dorsocentral and intra-alar setae), the large ventrally directed seta on the proepisternum, the particular form of the fore tarsus, and the unmodified wing and abdominal sternites. Another notable similarity is the row of dorsal setae on the hind tibia in males and females of *E. biobio* n. sp. and *E. enormis* n. sp. which is also a distinctive feature of the *E. armata* group. However, there are also distinct differences

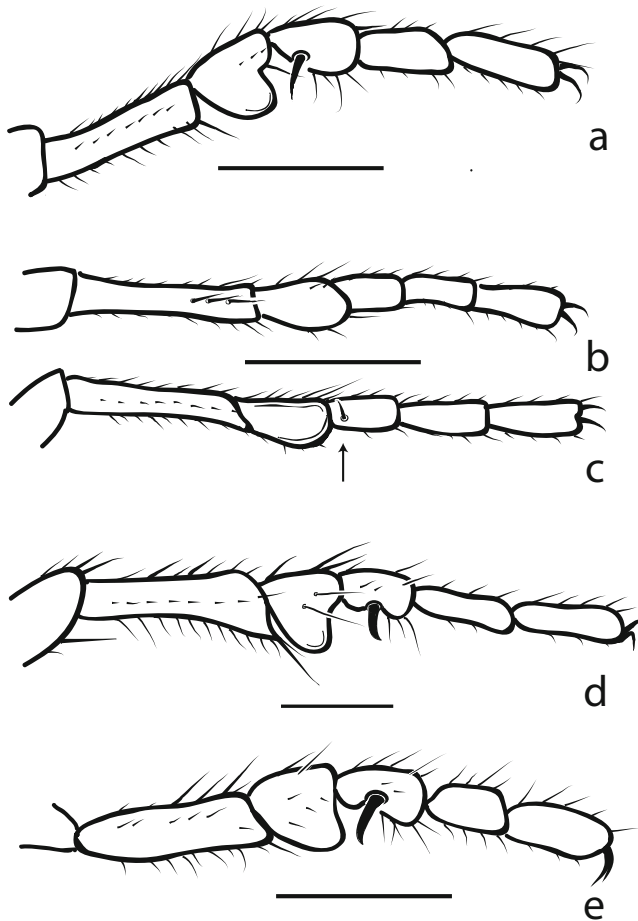


Fig 2 Fore tarsi of males in the *Enlinia chilensis* group. **a** *Enlinia biobio* n. sp., posterior view; **b, c** *Enlinia chilensis* n. sp., **b** anterior view, **c** posterior view; **d** *Enlinia enormis* n. sp., posterior view; **e** *Enlinia isoloba* n. sp., posterior view. In all figures, top of page is dorsal. Scale bars 0.1 mm.

between both species groups with the *E. chilensis* group featuring a fore femur without a row of very short and stout ventral setae (Robinson 1969, figs 82 and 85), and males with bilobed cerci with long setae (versus cerci in *E. armata* group with one lobe and lacking long setae). *Enlinia dominicensis* Robinson and *E. larondi* Robinson from Dominica also share a number of characters with the *E. chilensis* species group, but males of both species have cerci with one lobe without long setae, felt-like hairs on posterior surface of epandrium (lacking in *E. chilensis* group), and modified hind tarsus (unmodified in *E. chilensis* group) (Robinson 1975).

Enlinia biobio n. sp. (Figs 1b, 2a, and 3a)

Type Material. Holotype male: First label: “CHILE: Bío Bío (Region VIII)/Ñuble Province, 754 m/Valle Las Trancas/36°55′58.9″S 71°33′21.0″W/6-25.i.2013, white pan trap/M Pollet & A De Braekeleer.” Second label: “site Ñuble MT&PT02/WPT01-10/sample id: 13203.” Third label:

“HOLOTYPE ♂ *Enlinia biobio* Runyon & Pollet” [red label]. Deposited at MNHN. Paratypes: 1 female, the same label data as holotype (MNHN); 1 female, the same label data as holotype except collected in a blue pan trap (RBINS); 2 females, the same label data as holotype except collected with a Malaise trap (MAPC, MTEC).

Other Material Examined. One female, CHILE: Araucanía (Region IX), Malleco Province, 462 m, Cabañas Valle del Río, 38°27′36.2″S 71°57′31.2″W, 20.i.2013, site Valle del Río SW2, SW of Curacautin, sample id: 13449, sweep net, leg. M Pollet (RBINS).

Diagnosis. This relatively large *Enlinia* species is characterized by hind tibia with row of about 6 distinct dorsal setae (as in Fig 4a; basal-most seta partly hidden in figure); dorsal lobe of surstylus spatulate and distinctly projecting beyond cerci; ventral lobe of cercus longer than dorsal lobe with longest cercal setae about as long as the width of the epandrium (Fig 3a).

Description. Male. Habitus (Fig 1b). Body length 1.6 mm, wing length 1.5 mm by 0.6 mm wide. **Head:** face and frons dark metallic green with very sparse brown pollen. Eyes essentially contiguous on lower half of face, less than 1 ommatidium wide at narrowest point; anterior facets much enlarged. Palpus very small, black. Proboscis brown. Antenna (shape as in Fig 7a) brown: first flagellomere very short and blunt, twice as wide as long, round in anterior view, with sparse pale setulae that are longest near insertion of arista; arista-like stylus apical, about as long as the height of the eye. **Thorax:** scutum metallic dark green with sparse brown pollen; pleura dark brown. Setae on dorsum brown with pale reflections; 5 pairs of rather large acrostichal setae; 6 pairs of dorsocentral setae, the posterior-most distinctly larger; with one pair of large inwardly directed setae just in front of and lateral to anterior-most dorsocentral setae; scutellum with one pair of long, widely separated median setae and one pair of very small lateral hairs. Proepisternum with large ventrally directed seta just above fore coxa and a very small hair immediately above. **Legs:** entirely brown, with all setae and hairs black. Fore coxa with anterior surface sparsely covered with short setae that become longer toward apex. Mid coxa with two anterodorsal setae. Hind coxa with one anterodorsal setae near 1/2. Mid trochanter with anterodorsal seta near 1/2. Fore femur with slender erect ventral seta near base (length subequal to width of femur) and one posteroventral seta near apex. Mid femur with slender erect ventral seta near base (length about half width of femur); with one anterior seta, two anteroventral setae, and two posteroventral setae on apical four-fifths. Hind femur with longer dorsal setae, especially those near base which are more erect; with one large anteroventral and one large

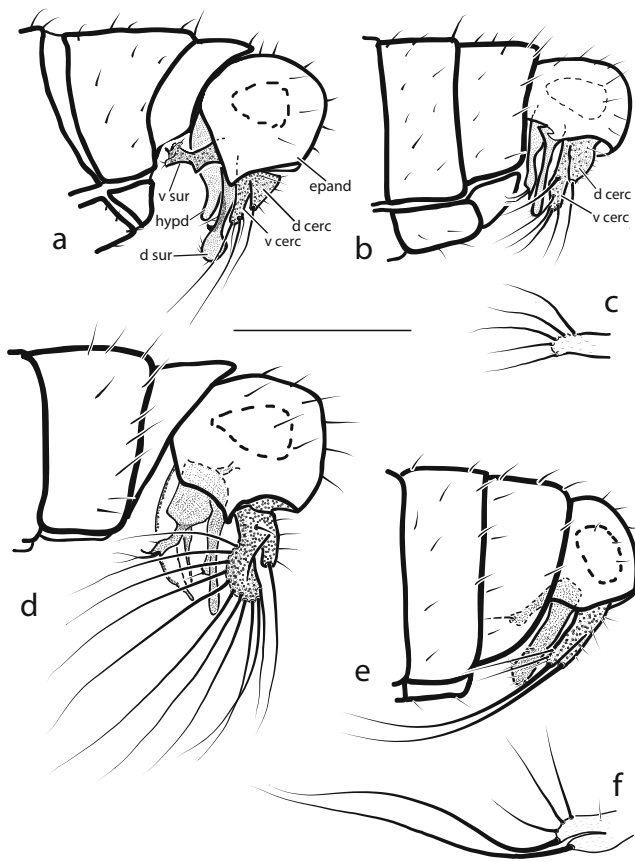


Fig 3 Apex of abdomen and terminalia of males in the *Enlinia chilensis* group, left lateral view. **a** *Enlinia biobio* n. sp.; **b**, **c** *Enlinia chilensis* n. sp., **c** ventral view of ventral lobe of the left cercus, top of page is lateral; **d** *Enlinia enormis* n. sp.; **e**, **f** *Enlinia isoloba* n. sp., **f** ventral view of lobes of the left cercus, top of page is lateral, posterior view. Scale bar 0.3 mm. **d** cerc, dorsal lobe of cercus; **d** sur, dorsal lobe of surstylus; **hypd**, hypandrium; **epand**, epandrium; **v** cerc, ventral lobe of cercus; **v** sur, ventral lobe of surstylus.

anterior preapical setae. Fore tibia with small dorsal setae near 1/3 and row of small anterodorsal setae on apical two-thirds; ventral surface bare except for small seta near apex. Mid tibia with large posterodorsal and smaller anterodorsal seta near 1/4. Hind tibia with anterodorsal seta near 1/4 and row of 6 posterodorsal setae that are more or less evenly spaced along full length (as in Fig 4a). Fore tarsus (Fig 2a); tarsomere 2 with broad ventral lobe, appearing heart-shaped in posterior view; tarsomere 3 with large black ventral seta near base. Mid and hind tarsi unmodified. Ratios of tibia:tarsomeres for fore leg, 18-6-4-3-4-5; for mid leg, 22-8-6-4-3-4; for hind leg, 28-7-8-5-4-4. **Wing** (as in Fig 6): unmodified, hyaline, elongate-oval, margins evenly rounded; veins nearly straight and evenly diverging from wing base; vein R_{2+3} curving slightly but distinctly forward at apex; vein R_{4+5} curving very slightly backward apically, ending a little before wing apex; crossvein dm-cu perpendicular to vein M_1 , about 1/3 length of apical part of vein CuA_1 ; vein A_1 represented as a brown streak close to anal margin. Halter brown.

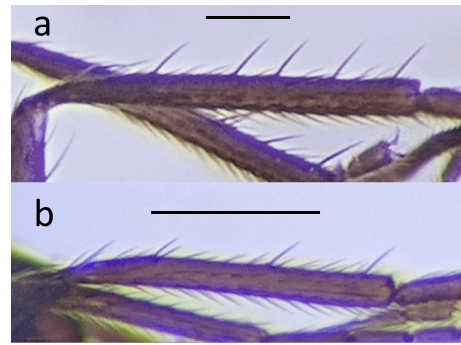


Fig 4 Hind tibia of males, anterior view. **a** *Enlinia enormis* n. sp.; **b** *Enlinia isoloba* n. sp. Scale bar 0.2 mm. Photos by Justin Runyon.

Abdomen: abdomen dark brown with slight green metallic reflections; setae black, those on dorsal surface stiff and curved inward. Sternites simple, without modified hairs or armatures. Hypopygium (Fig 3a). Epandrium dark brown, rather small. Cercus brown and divided into two lobes: a shorter triangular dorsal lobe with a large black seta at apex and a longer narrower ventral lobe with two large and two small black marginal setae. Surstylus bilobed, projecting beyond cercus (excluding marginal setae); the dorsal lobe long and narrow with spatulate apex bearing tiny setulae, and darkened narrow medial process arising near 1/2 that has a pointed apex that is arched ventrally; ventral lobe of surstylus rather square basally, narrowed near middle, apex with about four small finger-like lobes. Hypandrium weakly sclerotized, light brown, broad basally and gradually narrowing to rounded apex.

Female. Body length 1.5–1.7 mm, wing length 1.6 mm by 0.7 mm wide. Similar to male, but face very broad, about as wide as the first flagellomere in anterior view, and narrowest at mouth; fore tarsus unmodified; legs with setae as in males except ventral seta at base of mid femur absent (but ventral seta at base of fore femur still distinct), mid tibia with additional small anterodorsal seta just beyond 1/2 and with ventral seta at apex. Ratios of tibia:tarsomeres for fore leg, 17-8-3-2-2-4; for mid leg, 22-8-6-4-3-4; for hind leg, 30-6-8-5-4-4.

Etymology. The specific epithet *biobio* is derived from the Bío Bío Region of Chile and should be regarded as a noun in apposition.

Remarks. This species was collected on the banks of a small fast-running stream (tributary of Relbun River) in a forested but moderately well-lit gorge. Low numbers of specimens were collected in both white and blue pan traps and the Malaise traps, but none in the yellow pan traps that were also installed in this site (Fig 8b).

The female specimen collected in the Malleco Province (other material examined) differs somewhat from females from the Ñuble Province, notably in having darker legs, mid tibia with 2 distinct setae near 1/2, and slightly different

placement of dorsal setae on hind tibia. We have tentatively included this female as *E. biobio* n. sp., but it could represent another species.

Distribution. Chile: Bío Bío (Region VIII).

***Enlinia chilensis* n. sp.** (Figs 1c, 2b, c, 3b, c, and 7a)

Type Material. Holotype male: First label: "CHILE: Bío Bío (Region VIII)/ Ñuble Province, 765 m/Valle Las Trancas/ 36°56'01.9"S 71°33'14.1"W/6-25.i.2013, yellow pan trap/M Pollet & A De Braekeleer." Second label: "site Ñuble MT&PT01/YPT01-10/sample id: 13198." Third label: "HOLOTYPE ♂ *Enlinia chilensis* Runyon & Pollet" [red label]. Deposited at MNHN.

Diagnosis. This species is characterized by its mostly pale legs (Fig 1c); fore tarsomere 2 only slightly enlarged and tarsomere 3 with very small posteroventral seta (Fig 2b, c); and ventral lobe of cercus with five subequal black marginal setae (Fig 3b, c).

Description. Male. Habitus (Fig 1c). Body length 1.3 mm, wing length 1.3 mm by 0.5 mm. **Head:** face and frons dark metallic green with sparse brown pollen. Eyes nearly contiguous on lower half of face, about 1 ommatidium wide at narrowest point; anterior facets enlarged. Palpus not visible. Proboscis brown. Antenna (Fig 7a) brown; first flagellomere very short and blunt, twice as wide as long, slightly pointed apically, with sparse pale setulae that are longest near insertion of arista; arista-like stylus apical, about as long as the height of the eye. **Thorax:** scutum metallic dark green with sparse brown pollen that is denser laterally; pleura dark brown. Setae on dorsum brown with pale reflections; 5 pairs of small acrostichal setae; 6 pairs of dorsocentral setae, the posterior-most slightly larger; with one pair of large inwardly directed setae just in front of and lateral to anterior-most dorsocentral setae; scutellum with one pair of long, widely separated median setae and one pair of very small lateral hairs. Proepisternum with large ventrally directed seta and a very small seta immediately above. **Legs:** with all setae and hairs black. Fore coxa yellow, anterior surface sparsely covered with short setae. Mid and hind coxae brown, each with one anterodorsal seta near 1/2. Mid trochanter brown, with black anterodorsal seta near 1/2. Fore femur yellow with slender erect ventral seta near base (length subequal in width of femur). Mid femur brown, with very small slender erect ventral seta near base (length about half of femur width). Hind femur brown, with 2–3 longer dorsal setae near base. Fore tibia yellow, with 1–2 small dorsal setae near 1/3. Mid tibia mostly yellow but brownish at base, with large anterodorsal and smaller posterodorsal seta near 1/4. Hind tibia mostly yellow but brownish at base, with

anterodorsal seta at 1/4 and one posterodorsal setae at 1/4, one near 1/2, and one at 3/4, resp. Fore tarsus (Fig 2b, c) with tarsomeres 1–2 yellow and tarsomeres 3–5 brown; tarsomere 1 with row of 3 short, black anterior setae on apical half, and with apex slightly concave posteriorly; tarsomere 2 a little broadened, rounded ventrally and concave posteriorly; tarsomere 3 with very small posteroventral seta near base; remaining tarsomeres unmodified. Mid tarsus unmodified, with tarsomere 1 yellow-brown and tarsomeres 2–5 brown. Hind tarsus with tarsomere 1 yellow with very small ventral setae; tarsomeres 2–5 unmodified, brown. Ratios of tibia:tarsomeres for fore leg, 16-8-4-3-4-5; for mid leg, 20-9-5-4-3-3; for hind leg, 27-8-9-6-4-4. **Wing:** essentially as in *E. biobio* n. sp. (as in Fig 6). Halter yellow-brown. **Abdomen:** abdomen (tergites and sternites) dark brown with slight metallic green reflections; setae black, those on dorsal surface stiff and curved inward. Sternites simple, without modified hairs or armatures. Hypopygium (Fig 3b). Epandrium dark brown, rather small. Cerci pale brown and divided into two lobes: a short dorsal lobe that is somewhat triangular with a large black seta at apex and a larger ventral and rather flattened lobe that has five large black subequal marginal setae (Fig 3c). Surstylus divided into two long narrow lobes, the dorsal lobe rod-like with rounded slightly broadened apex bearing tiny setulae and medial process arising near 1/2; ventral lobe of surstylus narrowed near 1/2, with darkened, pointed apex and two curved setae arising close together just before apex. Hypandrium and phallus not visible.

Female. Unknown.

Etymology. This species is named for Chile, the country where it was discovered.

Remarks. This species was collected in a very humid and dark Nothofagus forest (Fig 8a) close to the moderately large Relbun River in an otherwise dry landscape (Fig 8c). The river itself is littered with rocks and pebbles.

Distribution. Chile: Bío Bío (Region VIII).

***Enlinia enormis* n. sp.** (Figs 1d, 2d, 3d, 4a, 5, and 6)

Type Material. Holotype male: First label: "CHILE: Los Lagos (Region X)/Osorno Province, 367 m/Parque Nacional Puyehue/40°40'09.6"S 72°10'23.0"W/12-18.i.2013, yellow pan trap/M Pollet & A De Braekeleer." Second label: "E. of Entre Lagos/sector Anticura/site Puyehue PT03/YPT01-09/sample id: 13233." Third label: "HOLOTYPE ♂ *Enlinia enormis* Runyon & Pollet" [red label]. Deposited at MNHN. Paratypes: 3 males, 2 females, the same label data as holotype (MNHN, RBINS, MAPC, MTEC).

Diagnosis. The very large body size of about 2.0 mm distinguishes *E. enormis* n. sp. at present from all other known species of *Enlinia*. The largest previously described *Enlinia* species are *E. bova* Runyon & Pollet and *E. maxima* Robinson with body lengths of 1.5 mm and 1.4 mm, respectively (Robinson 1975; Runyon & Pollet 2018). The form of the cerci in the male, notably being bilobed with ovate ventral lobe bearing fan of large marginal setae (Figs 1d and 3d), has not been observed before within *Enlinia*.

Description. Male. Habitus (Fig 1d). Body length 2.0–2.1 mm, wing length 1.7–1.8 mm by 0.7–0.8 mm wide. **Head:** face and frons dark green to nearly black, with sparse brown pollen. Eyes nearly contiguous on lower half of face, about 1 ommatidium wide at narrowest point; anterior facets enlarged. Palpus dark brown with anterior surface truncate and fringed with minute black hairs. Proboscis brown. Antenna (as in Fig 7a) brown; first flagellomere very short and blunt, twice as wide as long, round in anterior view, with sparse pale setulae that are longest near insertion of arista; arista-like stylus apical, slightly longer than the height of the eye. **Thorax:** scutum metallic dark green, with sparse brown pollen; pleura dark brown with slight metallic dark green reflections. Setae on dorsum brown with pale reflections; 5 pairs of rather large acrostichal setae; 6 pairs of dorsocentral setae, the two posterior-most setae distinctly larger; with one pair of large inwardly directed setae just in front of and lateral to anterior-most dorsocentral setae; scutellum with one pair of long, widely separated median setae and one pair of very small lateral hairs. Proepisternum with large ventrally directed seta just above fore coxa and a very small hair immediately above. **Legs:** entirely brown, with black setae and hairs. Fore coxa with anterior surface sparsely covered with setae. Mid coxae with one anterodorsal seta near 1/2 and usually a smaller anterodorsal seta near 1/3 and 3/4; anteroventral surface covered with numerous short ventrally directed setae. Hind coxa with one anterodorsal setae near 1/2 and one smaller anterodorsal seta near 3/4. Mid trochanter with anterodorsal seta near 1/2 and 1–2 smaller ventral setae. Fore femur with slender erect ventral seta near base (length subequal to width of femur) and row of short black anteroventral setae (Fig 5). Mid femur with slender erect ventral seta near base (length subequal to width of femur) and anteroventral row of short setae which become longer toward apex; with posteroventral row of 4–5 short setae on

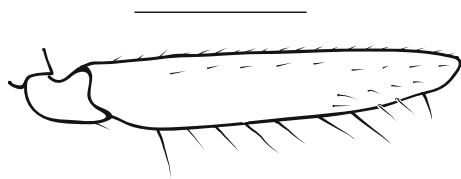


Fig 5 *Enlinia enormis* n. sp., fore trochanter and femur of male, anterior view. Scale bar 0.5 mm.

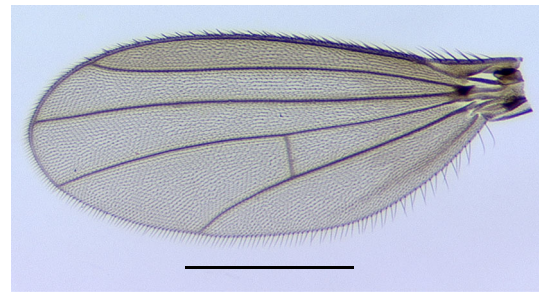


Fig 6 *Enlinia enormis* n. sp., wing of male. Scale bar 0.5 mm. Photo by Justin Runyon.

apical two-thirds that increase in size toward apex of femur. Hind femur with longer dorsal setae, especially near base which are more erect; with 3–4 anterior to anteroventral subapical setae. Fore tibia with small dorsal seta near 1/3 and row of short setae (length less than width of tibia) along dorsal and ventral margins. Mid tibia with one large posterodorsal seta and one smaller anterodorsal seta near 1/4; ventrally with some erect setae on apical half (length subequal to width of tibia). Hind tibia with one anterodorsal seta near 1/4 and row of 6 posterodorsal setae that are more or less evenly spaced along full length (Fig 4a). Fore tarsus (Fig 2d) similar to *Enlinia biobio* n. sp. but tarsomere 3 with large ventral seta stouter and positioned closer to 1/2 of tarsomere. Mid and hind tarsi unmodified. Ratios of tibia:tarsomeres for fore leg, 20-8-4-4-5-5; for mid leg, 26-10-7-5-4-5; for hind leg, 26-7-10-7-4-6. **Wing** (Fig 6), essentially as in *E. biobio* n. sp. but slightly more infuscated. Halter dark brown. **Abdomen:** dark brown with slight green metallic reflections; setae black, those on dorsal surface stiff and curved inward. Sternites simple, without modified hairs or armatures. Hypopygium (Fig 3d). Epandrium dark brown and not embedded in tip of abdomen. Cerci brown and divided into two lobes: a shorter triangular to digitiform dorsal lobe with a large black seta at apex and a large ovate ventral lobe with about 12 large slender similar-sized setae along margin. Surstylus bilobed, not projecting beyond cercus (excluding marginal setae); the dorsal lobe long and slender with rounded apex, and narrow medial process arising near 1/2 that has a rounded apex that bears one small seta; ventral lobe of surstylus broad basally, narrowed near middle, apex rounded with two preapical dorsal setae. Hypandrium

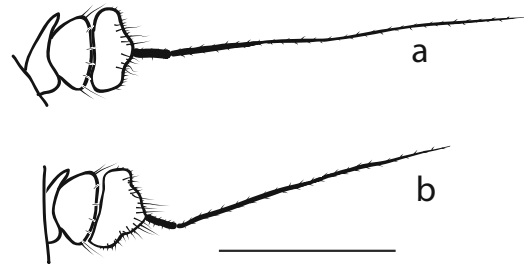


Fig 7 Antenna of males, lateral view. **a** *Enlinia chilensis* n. sp.; **b** *Enlinia isoloba* n. sp. Scale bar 0.1 mm.

weakly sclerotized, light brown, broad basally and rather abruptly narrowing to rounded apex. Phallus narrow in lateral view and with sharply pointed apex.

Female. Body length 2.1–2.2 mm, wing length 1.8–1.9 mm by 0.9 mm wide. Similar to male, but face wider (about as wide as the width of the first flagellomere) and narrowest below clypeus; fore tarsus unmodified; legs with setae as in males except ventral setae on fore and mid femora very small and mid tibia with additional posterodorsal seta at 1/2, anterodorsal seta just beyond 1/2 and near apex, and ventral subapical seta. Ratios of tibia:tarsomeres for fore leg, 20-10-4-3-3-4; for mid leg, 26-12-6-4-3-4; for hind leg, 32-8-10-6-4-4. Wing as in the male, but slightly broader.

Etymology. The specific epithet is from the Latin *enormis* = “huge, enormous” and is in reference to the relatively large body size, which makes this the largest known species in *Enlinia*.

Remarks. All specimens were collected in yellow pan traps ($n = 9$) that were in operation on a sunny sandy bank of the river Anticura, in which a large number of large rocks were dispersed (Fig 8d). No other traps were employed in this sampling site.

Distribution. Chile: Los Lagos (Region X).

***Enlinia isoloba* n. sp.** (Figs 1e, 2e, 3e, f, 4b, and 7b)

Type material

Holotype male: First label: “CHILE: Bío Bío (Region VIII)/Ñuble Province, 754 m/Valle Las Trancas/36°55′58.9″S 71°33′21.0″W/6-25.i.2013, Malaise trap/M Pollet & A De Braekeleer.” Second label: “site Ñuble MT&PT02/sample id: 13201.” Third label: “HOLOTYPE ♂ *Enlinia isoloba* Runyon & Pollet” [red label]. Deposited at MNHN. Paratypes: 3 males, 3 females, the same label data as holotype (MNHN, RBINS, MAPC, MTEC).

Diagnosis. *Enlinia isoloba* n. sp. is distinguished from other known species in the *Enlinia chilensis* group in males having the two lobes of the cercus subequal in length and each lobe bearing one large seta at apex (Fig 3e, f). Males of the other species have the dorsal cercal lobe distinctly smaller and shorter than the ventral lobe (Fig 3a–d).

Description. Male. Habitus (Fig 1e). Body length 1.1–1.2 mm, wing length 1.1 mm by 0.5 mm wide. **Head:** face and frons dark brown to black with very sparse brown pollen. Eyes nearly contiguous on lower half of face, 1 ommatidium wide at narrowest point; anterior facets much enlarged. Palpus dark brown with thick brown pollen. Proboscis brown. Antenna (Fig 7b) brown; first flagellomere short and blunt,

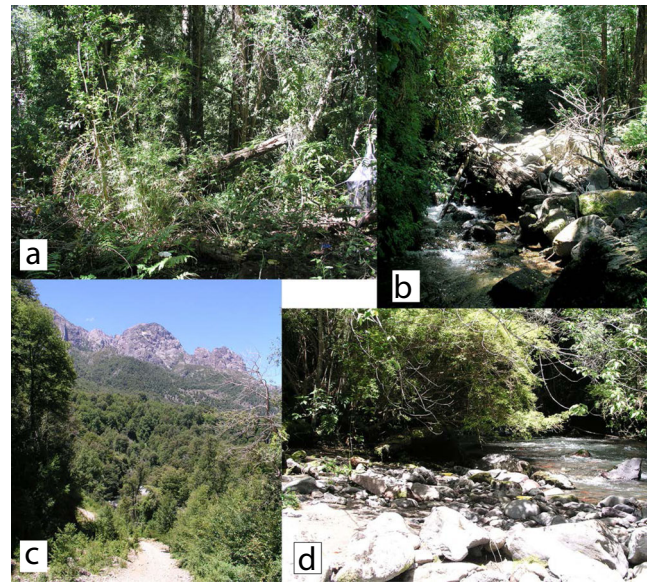


Fig 8 Type localities of *Enlinia* in Chile. **a** Type locality of *Enlinia chilensis* n. sp., Valle Las Trancas, Ñuble Province. **b** Type locality of *Enlinia biobio* n. sp. and *Enlinia isoloba* n. sp., Valle Las Trancas, Ñuble Province. **c** Dry Valle Las Trancas landscape. **d** Type locality of *Enlinia enormis* n. sp., sector Anticura of Puyehue National Park, Osorno Province. Photos by Marc Pollet.

but distinctly pointed apically and more pointed than in other species in this group, about twice as wide as long, round in anterior view, with rather dense pale setulae that are longest near insertion of arista; arista-like stylus apical, slightly shorter than the height of the eye. **Thorax:** scutum metallic dark green with slight metallic blue reflections, covered with brown pollen that is most dense laterally and on scutellum; pleura dark brown with some lighter brown pollen. Setae on dorsum brown with pale reflections; 5 pairs of rather large acrostichal setae; 6 pairs of dorsocentral setae, the two posterior-most distinctly larger; with one pair of large inwardly directed setae just in front of and lateral to anterior-most dorsocentral setae; scutellum with one pair of long, widely separated median setae and one pair of very small lateral hairs. Proepisternum with large ventrally directed seta just above fore coxa and a very small hair immediately above. **Legs:** entirely brown with most setae brown to black often with pale reflections. Fore coxa with anterior surface sparsely covered with rather stiff, short black setae. Mid coxae with 1–2 black anterodorsal setae. Hind coxa with 1 black anterodorsal setae near 1/2. Mid trochanter with 1–2 black ventral setae near 1/2. Fore femur with small slender erect black ventral seta near base (shorter than width of femur) and row of about 10 short setae on anteroventral edge along full-length of femur (shorter than half width of femur), and one posteroventral seta near apex. Mid femur with slender erect ventral seta near base (length subequal to width of femur) and row of about 6 similar-sized anteroventral setae along most of length of femur; with one anterior seta near

apex. Hind femur with longer dorsal setae, especially near base; with two anterior to anteroventral subapical setae. Fore tibia with 1–2 dorsal setae near 1/3 and dorsal row of very short setae. Mid tibia with large posterodorsal seta and smaller anterodorsal seta near 1/4. Hind tibia with a small anterodorsal seta near 1/4 and 1/2 with small posterodorsal seta at base, 1/4, just beyond 1/2, and near apex (Fig 4b). Fore tarsus (Fig 2e) similar to *E. biobio* n. sp. and *E. enormis* n. sp. except tarsomere 2 less indented on distal edge and thus less heart-shaped. Mid and hind tarsi unmodified. Ratios of tibia:tarsomeres for fore leg, 16-4-2-2-3; for mid leg, 18-6-4-3-2-4; for hind leg, 22-6-6-4-3-4. *Wing*: hyaline, essentially as in *E. enormis* n. sp. (Fig 6) but less infuscated. Halter wholly brown. *Abdomen*: dark brown with slight metallic green reflections and light brown pollen; setae black, those on dorsal surface stiff and curved inward. Sternites simple, without modified hairs or armatures. Hypopygium (Fig 3e). Epandrium dark brown, small, embedded in tip of abdomen. Cerci brown and divided into two nearly equal-sized lobes each bearing one long seta at apex (Fig 3f); the ventral/lateral lobe is slightly larger with 3 smaller setae along lateral margin basad to large apical seta (Fig 3f). Surstylus bilobed, distinctly projecting beyond cercus (excluding marginal setae); the dorsal lobe longer than cerci with scattered short setulae on apical half and one larger ventral seta near 3/4 (not clearly visible in Fig 3f); ventral lobe of surstylus hidden within abdomen, shorter with slightly expanded apex bearing one seta. Hypandrium weakly sclerotized, light brown, broad with broadly rounded apex.

Female. Body length 1.0–1.1 mm, wing length 1.1–1.2 mm by 0.5 mm wide. Similar to male, but face wider (about as wide as the width of the first flagellomere) and narrowest at mouth; antenna shorter and blunter but still with faintly conical apex when compared to females of other species in this species group; fore tarsus unmodified; legs with setae as in males except ventral setae on fore and mid femora very small, mid tibia with additional one posterodorsal seta and one anterodorsal seta near 1/2, and one ventral seta at apex. Ratios of tibia:tarsomeres for fore leg, 15-6-3-2-2-4; for mid leg, 20-6-3-2-2-3; for hind leg, 24-6-6-4-3-4. Wing as in the male.

Etymology. The specific epithet is in reference to the similar sized lobes of the cercus in males (Fig 3e, f).

Remarks. This species was collected at the same site as *Enlinia biobio* n. sp. (Fig 8b). Contrary to the latter species, all specimens of *E. isoloba* n. sp. were collected in a Malaise trap.

Distribution. Chile: Bío Bío (Region VIII).

Discussion

The four new species described here in the *Enlinia chilensis* group seemingly form a monophyletic group based on putative apomorphic characters of males, notably the structure of the cercus. This group is probably related to the *E. armata* group (Robinson 1969), based on the chaetotaxy of the thorax, the structure of the fore tarsi in males (MSSCs), and the unmodified abdominal sternites and wings. These shared characters and the overlap of distinctive large dorsal setae on the hind tibiae suggest the *E. chilensis* group could be derived from the more widespread *E. armata* group (or vice versa). However, *Enlinia* are poorly documented in the tropics, especially in South America, and more sampling is needed to understand the distribution of the species in this subcontinent and their morphological variation and delimitation of species groups. This might also help to adequately assess evolutionary relationships in this diverse genus. The need for and importance of inventorying megadiverse groups, like Diptera, are outlined by Borkent *et al* (2018).

At least in the Andean mountain range and other sites investigated by MP in central and southern Chile, *Enlinia* is not commonly found. The genus was represented by only four species based on 21 specimens from a total of 111 dolichopodid species recognized from the total Chilean collection of 8247 specimens (Pollet & Arias 2014). But it does not seem to be restricted to the tropical and subtropical parts of Chile in the north and center of the country, considering its presence in Puyehue National Park (*E. enormis*) and on Chiloé Island (*E. atrata*). There is no doubt that dedicated search for these minute flies in suitable habitats, e.g., wet rocky substrates in and along running water and seeps will yield yet additional species and distribution records. Due to the minute size of the species, random sweeping of wet rocky surfaces and depositing the entire collection into alcohol (without immediate inspection) will prove much more efficient than retrieving the individual specimens with, e.g., a pooter in the field. This seems to be confirmed by the fact that none of the 124 sweep net samples contained *Enlinia*. On the other hand, both Malaise traps and colored pan traps produced small numbers.

Notes on *Enlinia atrata*

The fifth species of *Enlinia* known from Chile is *E. atrata* (Van Duzee) which was described in 1930 and originally placed in *Achalcus* Loew (Van Duzee 1930), but transferred to *Enlinia* by Robinson (1970) (see also Pollet 2005). Examination of the holotype (in NHMUK; Fig 1a) confirms placement of this species in *Enlinia*. This species was described from Ancud on Chiloé Island off the coast of Chile at approximate latitude 42° south. Van Duzee (1930, p. 24) stated that “These specimens...were all found in a small damp and rather dark grotto

near the top of the hill above the town park [of Ancud].” The elevation of the highest point of the hill above Ancud is about 100 m. *E. atrata* remains the only Chilean *Enlinia* species recorded from lower elevations and from the coast, as all species in the *Enlinia chilensis* group were discovered in the Andes Mountains (from 367 to 765-m elevation).

Acknowledgements A number of people and organizations considerably contributed to the success of the survey “Arthropods of Valdivian Temperate Rain Forests (AVTR).” First of all, many thanks are due to Mr. Eduardo Katz Gaudlitz and Mr. Ivan Benoit of the CONAF (Corporación Nacional Forestal) headquarters in Santiago (Chile) who provided MP with the necessary permit to access and conduct the sampling in the National Parks and to export the samples to the home lab in Belgium. We also greatly appreciated the kindness and helpfulness by the respective CONAF park guards (e.g., Angel Lazo, Puyehue National Park) which was essential for the selection of suitable sampling sites. Dr. Wouter Dekoninck (RBINS) and Dr. Mario Elgueta (MNHN) kindly agreed to collaborate and curate the deposited Dipteran material. Dr. Duncan Sivell (NHMUK) kindly provided us with additional photographs of the holotype specimen of *Enlinia atrata*. MP expresses his sincere gratitude to the Leopold III Fund which provided financial support for the survey. And last but not least, we are truly indebted to Dr. Elisabeth Arias (Berkeley, USA) who not only introduced us to the magnificent country of Chile, but also assisted us in the administrative process. She made this journey an unforgettable experience through her hospitality, friendship, and enjoyable company.

Author Contribution Statement MP planned and executed the field work, JR described and illustrated the species, and JR and MP wrote the manuscript.

Nomenclature

ZooBank registration can be found at: [zoobank.org:pub:E68BAD5A-A98C-4F73-A70B-3C634A98630F](https://zoobank.org/pub:E68BAD5A-A98C-4F73-A70B-3C634A98630F)

Enlinia biobio
n. sp.: [zoobank.org:act:9F3384F3-B23F-4F8D-9498-99F10B84B960](https://zoobank.org/act:9F3384F3-B23F-4F8D-9498-99F10B84B960)

Enlinia chilensis
n. sp.: [zoobank.org:act:652E2519-7AB6-41A1-AD38-0299AEA48959](https://zoobank.org/act:652E2519-7AB6-41A1-AD38-0299AEA48959)

Enlinia enormis
n. sp.: [zoobank.org:act:6A44E569-FF93-4FF7-B31E-5985E45312FE](https://zoobank.org/act:6A44E569-FF93-4FF7-B31E-5985E45312FE)

Enlinia isoloba
n. sp.: [zoobank.org:act:4BE1C07A-344E-455E-AF83-A2FD2A9996C1](https://zoobank.org/act:4BE1C07A-344E-455E-AF83-A2FD2A9996C1)

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